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An Internal Combustion Engine Exhaust Component and a Method of Making an Internal Combustion Engine Exhaust Component

This invention relates to an internal combustion engine exhaust component and particularly, but not exclusively limited to, the rear box of an internal combustion engine exhaust and to a method of making such an internal combustion engine exhaust component.

Components for internal combustion engine exhaust systems are designed to withstand extremely harsh conditions and to retain their integrity over a substantial period of time. In particular, most exhaust systems are guaranteed, normally for a period of three years and during that time the material from which the exhaust system is constructed must withstand extremes of temperature, external environmental conditions such as water, dust and salt and must also be able to withstand the contents of the exhaust gases expelled from the internal combustion engine. In particular, the exhaust components must withstand, internally, gas at very high temperatures, unburnt fuel, particulates carried in the gas and condensates, in particular condensates produced as a by-product of the catalytic processes now generally required of exhausts to meet environmental regulatory standards. The rear box of internal combustion engine exhausts receives a combination of gas, particulate and condensates. The condensates are corrosive. Accordingly, it is known to provide condensate evacuation devices to remove condensate from the rear box so as to prevent the condensate from building up and corroding the rear box from the inside out. Also, it is known to apply an anticorrosive lining to the interior of the rear box. The anticorrosive lining material is relative expensive compared to the material use for the remainder of the exhaust system.

It is an object of the invention to provide an improved combustion engine exhaust component.

According to a first aspect of the invention there is provided an internal combustion engine exhaust component comprising a shell having outer and inner surfaces and defining a chamber, the inner surface of the shell having a first part susceptible to exhaust condensate contact and a second part not susceptible to exhaust condensate contact, a

lining being applied over the first part only so as to protect the first part from exhaust condensate contact.

By limiting the application of the anticorrosive material only to those parts where condensate is likely to contact, the material cost for the exhaust component is substantially reduced without effecting the life and/or performance of the component. Incidentally, a small weight reduction is also achieved.

The shell is preferably made from a material which is thicker than the chamber lining. The shell is preferably 0.8mm thick and most preferably conveyed from DIN 1.4512. The chamber lining is preferably 0.5mm thick and most preferably made from DIN 1.4113.

The lining may be applied to the inner wall of the outer shell by a variety of means but most preferably by spot welding.

The chamber lining preferably covers approximately one-third to one-half of the surface area of the inner wall of the outer shell.

According to a second aspect of the invention there is provided an internal combustion engine exhaust component comprising a shell having outer and inner surfaces and defining a chamber and a lining applied over one-third to one-half of the surface area of the inner surface of the shell.

According to a third aspect of the invention there is provided a method of making an internal combustion engine exhaust component comprising the steps of providing a shell having outer and inner surfaces and defining a chamber, determining the parts of the inner surface of the shell which will be contacted by condensates when in operation and applying a lining to those parts of the shell.

The method preferably comprises the step of providing the shell as a substantially flat sheet of material, applying the lining to the shell and then forming the shell into the shape

of the exhaust component. The lining is preferably applied by spot welding the lining to the shell.

An internal combustion engine exhaust component will now be described in detail by way of example and with reference to the accompanying drawings in which:-

Fig.1 is a side sectional view of an internal combustion engine exhaust component in accordance with the invention,

Fig.2 is a sectional view taken on line II-II in Fig.1,

Fig.3 is an enlarged sectional view of the part of the exhaust component of Fig.2 circled and indicated at III, and

Fig.4 is an enlarged sectional view of part of the exhaust component of Fig.2 circled and indicated at IV.

In Fig.1 an exhaust component 10, in particular a rear box of an internal combustion engine exhaust, comprises a cylindrical shell 12 with an input end cap 14 and an output end cap 16. The shell 12 and end caps 14, 16 define a chamber 18. Two circular baffles 20, 22 are arranged within the chamber 18 spaced apart from one another. The first baffle 20 is arranged towards the input end cap 14 and the second baffle 22 is arranged towards the output end cap 16. The chamber 16 is thus subdivided into first, second and third sub-chambers 18a, b, c, the first sub-chamber 18a being defined between the input end cap 14 and the first baffle 20, the second sub-chamber 18b being defined between the first baffle 20 and the second baffle 22 and the third chamber being defined between the second baffle 22 and the output end cap 16. An input pipe 24 extends through an aperture 26 in the input end cap 14, through an aperture 28 in the first baffle 20 and through an aperture 30 in the second baffle 22. The input pipe 24 is received with an interference fit through the apertures 28, 30. The input pipe 24 has a plurality of perforations 32 formed in its wall in the region of the pipe between the first and second baffle 20, 22. An output pipe 34 extends from the subchamber 18a through apertures 36, 38 in the first and second baffles 20, 22 respectively and through an aperture 40 in the output end cap 16. The outlet pipe 34 is received with an interference fit by the apertures 36, 38. Generally, when installed on a

vehicle the component 10 is arranged such that the input pipe 24 is above the output pipe 34.

The baffles 20, 22 each have a port 42, 44 respectively formed at the outer edge thereof beneath the output pipe 34.

Turning to Fig.2, in rear boxes of internal combustion engine exhausts, condensates can build up. Fig.2 illustrates the condensates at reference numeral 46. As stated above, it is known to use condensate evacuation devices to evacuate the condensate from the rear box. The condensate evacuation devices will only allow a certain amount of condensate to remain in the rear box before the condensate is evacuated. Accordingly, the maximum level of condensate 46 is known for each such component. In Fig.2 the maximum level of condensate is indicated by the depth D. Of course, when the exhaust component 10 is arranged on a vehicle it is subjected to acceleration forces due for example to the exhaust system vibrating or to the motion of the vehicle to which the exhaust system is connected. That will cause some movement of the condensate within the exhaust component 10 and the maximum extent of that movement of the condensate 46 can be calculated for each component by carrying out appropriate testing of the exhaust component, for example, by vibration testing and by road testing of example systems on a vehicle. The maximum extent of condensate movement is indicated in Fig.2 between the radial lines A and B. Accordingly, the area of the inner surface of the shell 12 between the lines A and B will be subjected to an increased level of corrosion due to the contact with the condensate. In the present invention a lining 48 is applied to the inner surface of the shell 12 in the region between the lines A and B. The lining is more clearly illustrated in Fig.3.

Generally the shell 12 would be made from DIN 1.4512 with a thickness of 0.8mm and the lining 48 applied to the area between the lines A and B will comprise material DIN 1.4113 of 0.5mm thickness. Of course, alternative materials and/or thicknesses of material are within the ambit of the skilled person to select depending upon the particular component and circumstances pertaining to that component.

The lining 48 is applied to the relevant surface of the shell 12 by spot welding. Generally, the lining will be applied to the shell when the shell is arranged as a flat sheet and the shell will then subsequently be bent around the baffles 28, 30 and the shell 12 will be crimped to secure the shell 12 relative to the baffles 20, 22. The crimp 50 is shown in detail in Fig.4 and is conventional in form. Subsequently, the end caps 14, 16 will be applied to the subassembly of the outer shell.

The present invention provides a substantial saving on material cost and also provides a small weight saving without compromising the corrosion resistance or wear properties of the exhaust component 10.